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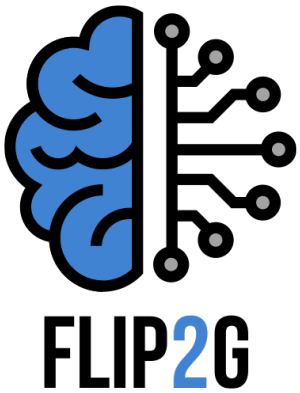

Deliverable 6.4

Interim Exploitation and Sustainability Plan

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Editor(s):	**Evangelia Triantafyllou (AAU), Muriel Algayres (AAU)**
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Deliverable factsheet

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Project Title:	**Enhancing education and training through data-driven adaptable games in flipped classrooms (FLIP2G)**

Title of Deliverable:	**D6.4 – Interim Exploitation and Sustainability Plan**
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Contributor(s):	**All partners**
Reviewer(s):	**Christos Malliarakis (Mantoulides Schools)**
Approved by:	**All Partners**

Abstract:	**The exploitation plan reports the consortium's strategy towards exploiting the project's results. It includes an analysis of the relevant market and current conditions, existing competitors versus own positioning, potential users and collaborators as well as opportunities and barriers at EU level and Member State level. The exploitation and sustainability plan will be constructed and documented in two phases. This initial report provides a preliminary outline of the exploitation and sustainability plan for after project end including relevant exploitation/ sustainability models, partners' involvement in future exploitation activities, plans for promotion and valorisation, solutions to potential financial or IPR/licensing issues encountered, etc.**
Keyword List:	**Exploitation, Sustainability, Business Model**

Consortium

	Role	*Name*	*Short Name*	*Country*
1.	Coordinator, PBL	Aalborg University	AAU	Denmark
2.	Games developer	Nurogames GmbH	Nurogames	Germany
3.	PBL, academic partner	University of Macedonia	UOM	Greece
4.	Data analytics	ARTIFICIAL INTELLIGENCE TECHNIQUES, SL	Artelnics	Spain
5.	Academic partner	Northumbria University	Northumbria	UK
6.	Flipped classrooms	EKPAIDEFTIRIA E. MANTOULIDI S.A.	Mantoulides	Greece
7.	Secondary education	Revheim skole, Stavanger Kommune	Revheim	Norway

Revision History

Version	*Date*	*Revised by*	*Reason*
V0.1	08/06/2020	Evangelia Triantafyllou	First full version distributed for comments
V0.2	16/06/2020	Evangelia Triantafyllou	Comments and input from partners incoroporated
V1	29/06/2020	Mandoulides	Final version after internal review

Statement of originality:

This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

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List of Abbreviations

The following table presents the acronyms used in the deliverable in alphabetical order.

Abbreviation	*Description*
EC	European Commission
IP	Innovation Product
IPR	Intellectual Property Rights
LA	Learning Analytics
LD	Learning Design
PBL	Problem Based Learning
WP	Work Package

Executive Summary

The FLIP2G project aims to establish a Knowledge Alliance between higher education institutions, schools and private companies that will boost skills development and introduce novel, data-driven approaches to education and training. The consolidation of all efforts will provide a transnational set of results, as follows:

- a new pedagogical method that combines PBL and flipped classroom with game-based learning (FLIP2G educational approach)
- a simulation-based serious game that supports PBL-enhanced flipped classroom processes, adaptive pathways and educational data recording
- learning designs for higher education, schools and business that support the Flip2G paradigm
- learning analytics features that produce informative insights on learning process.

The aim of WP6 is twofold. Firstly, to create awareness on the project and disseminate its progress and results to the appropriate stakeholders including policy makers, market players and researchers/academics from the targeted sectors. Secondly, to prepare the ground for the result's exploitation after the project end, i.e. open and free distribution of project results to the market including the ICT industry, the public sector and the academic community.

This deliverable presents preliminary results of the work performed by the consortium on exploitation and sustainability plans as outlined in the project description. The objective of this work is to establish a well-defined approach on how results from the projects are transformed and composed from project results/exploitation items to innovative solutions that are applicable on the market of learning technology and service providers.

As a sustainability methodology, an open innovation approach is applied that enables an involvement of external communities of practice (concept, content, technology) to pick-up results independent of technological readiness or maturity and contribute to the development effort beyond the scope of the project.

From an exploitation and commercialisation background, an initial step has been performed to identified individual strategies and related exploitation items, categorize them and trigger the discussion on required transformation. Based on these results, the exploitation work is further refined in the upcoming and final deliverable to set the exploitation ideas in the context of a consortium wide view and provide indications on how the solution as a whole can be sustained.

1 Introduction

This deliverable presents preliminary results of the work performed by the consortium on exploitation and sustainability plans as outlined in the project description. Based on the findings in the technical and application WPs, an initial exploitation and sustainability collection has been outlined and defined. This analysis was performed using the individual interests of the partners in project results as a starting point, further refined and categorized initially based on the project objective and target audiences. This means that the exploitation strategies is defined bottom-up, starting with a formalization on an individual level, enhanced by consortium-wide discussions and the establishment of a common description framework.

Based on this results, the exploitation work is further refined in the upcoming and final deliverable to set the exploitation ideas in the context of a consortium wide view and provide indications on how the solution as a whole can be sustained.

1.1 Scope

The scope of the deliverable is to establish an initial plan on exploitation and sustainability efforts in the project. The approach selected starts from the individual partner plans and elevates them into a coherent consortium-wide instrument.

1.2 Audience

The deliverable is targeted to report on plans for exploitation and sustainability after the conclusion of the project. The target audience are the involved partners and the enactment of their strategies to sustain project results.

1.3 Structure

The structure of the document in its preliminary version is as follows: Section 2 discusses the methodology on how the plan has been established. It introduces the approach to develop innovation and exploitation items from project results and defines a framework for interaction among the owning parties. Section 3 describes the potential buyers/ users, performs a preliminary market analysis on learning analytics and serious games and suggests the target groups for project results. Section 4 provides insight in the individual plans as retrieved from all partners, before concluding in Section 5.

2 Exploitation Strategy: Project Result to Innovation Item

This section introduces the bottom-up methodology introduced to transform project results continuously to exploitable innovation items. This approach takes results from the project work as input, aligns with the strategies of partners and the consortium as a whole, and triggers the required transformation process.

2.1 FLIP2G Exploitation and Sustainability Planning Methodology

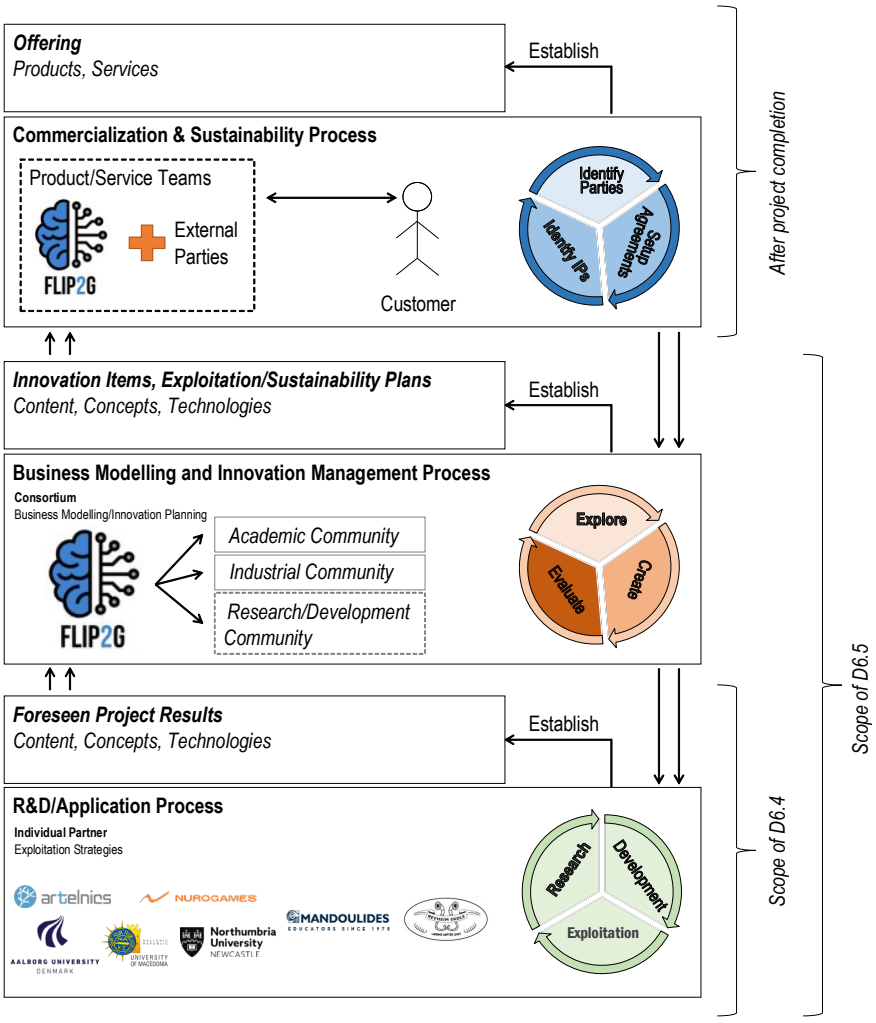

Figure 1. FLIP2G Exploitation and Sustainability Planning Methodology

Figure 1 defines the methodology and framework for exploitation and sustainability planning in FLIP2G. The methodology is based on the work performed in [1], refined and set into the context of innovation and research projects in [2]. The approach is established for digital services and transformation and is deemed appropriate for the purpose of the project. The above methodology

has been adapted to consider a) the project plan/logic as well as specific aspects in the consortium related to exploitation and sustainability aspects.

As a bottom-up approach, the different levels of the methodology are briefly introduced below:

Table 1. Methodology: R&D/Application Process

R&D/Application Process	
Process Phases	The phases in this process cover the project work with a focus on exploitation of project results. The outcome of this process is a set of exploitation items applicable in the context of the project objectives. **Research:** Transformation and evolution of existing knowledge of partners and combination. **Development:** Realization phase of exploitation items as concepts, content and technology. **Exploitation/Application:** Usage of project results in the application cases/pilots and evaluation results. The results are assessed from a maturity and technology readiness background.
Outcomes	Exploitation items as project results (e.g. deliverables, prototypes, concept papers, publications). These project results are produced through the collaboration of partners and formally made available as deliverables. The results are realized in accordance with individual exploitation strategies and assessments by partners.
Involved Partners	All project partners, organized in WPs and tasks according to the project plan

The initial phase as introduced above represents the actual project work, planned in accordance with the project objectives.

The second level covers the required transformation from project results to innovation items. Each item identified is analysed and evaluated. The work in this phase is performed in the upcoming period of the project through dedicated exploitation sessions in a consortium-wide setting.

Table 2. Methodology: Business Modelling and Innovation Management Process

Business Modelling and Innovation Management Process	
Process Phases	The phases in this process cover the transformation steps of project results/exploitation items to innovation items. The phases defined cover this transformation from an organizational background, exploring different options on exploitation of results and their applicability beyond the scope of FLIP2G. **Explore:** the exploration phase aims to understand which results are exploitable. The consortium aims to understand the type of configuration and combination required to establish an innovation items and their impact on the market and target audience. **Create:** business modelling and sustainability planning is covered in this phase. The resulting plans are input for assessment and evaluation. **Evaluate:** Evaluation of business and sustainability plans through investigation into the market and competition structure.
Outcomes	Business Models and Sustainability plans are established, evaluated by experienced project team members and compared to existing market trends.
Involved Partners	Consortium-wide exploitation team

The top level aims to enact the sustainability and exploitation plans. This level is out of scope of the work performed and documented in D6.4 and D6.5.

Table 3. Methodology: Business Modelling and Innovation Management Process

Commercialization & Sustainability Process	
Process Phases	The phases in this process aim to define the structure of applicable innovation items and their composition. The core aspect is to identify relevant intellectual property structure and find agreements to be used during actual project based on FLIP2G results. **Identify IPs:** define the relevant IPR structure for products (which partner owns what, what kind of dependencies need to be considered) and license

	agreements **Identify Parties:** identify relevant parties that need to be involved in case of commercial activities **Setup Agreements:** structure collaboration agreements for products and services made available
Outcomes	The outcomes of this level are commercializable products and services that cover needs of customers in the field.
Involved Partners	Partners of the project consortium and external parties

2.2 FLIP2G Value Proposition

As output from the bottom level of the methodology defined above, the following items have been derived based on individual partner plans, interest and expertise. Project results as exploitation items are categorized in three dimensions: a) content, understood as an externalization of knowledge, b) concept as methods, approaches and techniques and c) technology as software artifacts configured and developed in FLIP2G.

Figure 2 shows the exploitation items graphically, assigned to the specified categories. Eleven items have been defined that cover the results established in the technical and application work packages.

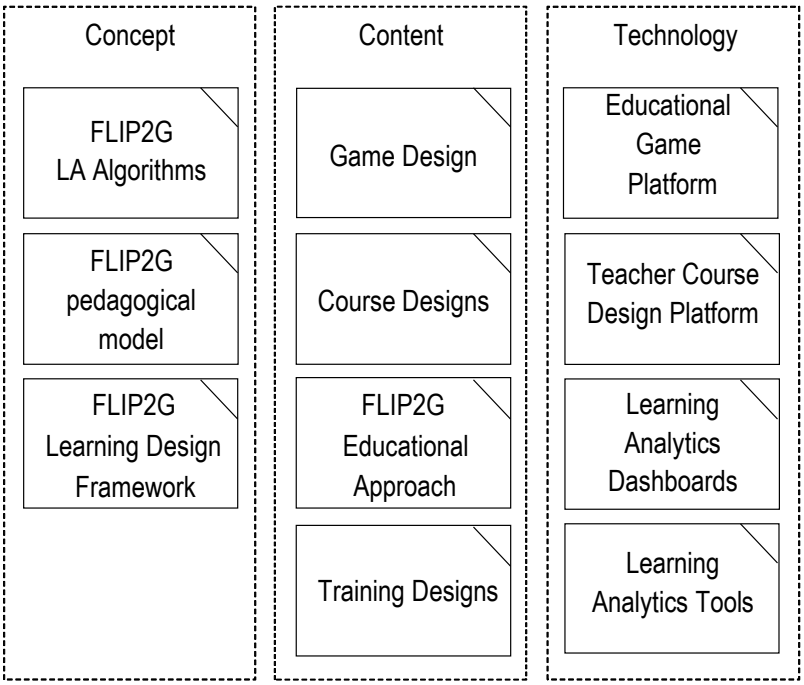

Figure 2. FLIP2G Exploitation Items

3 Market Analysis

3.1 Preliminary market analysis

In the following sections, we attempt to conduct a preliminary market analysis for the two main innovation sectors of the project: learning analytics and serious games.

3.1.1 Learning Analytics

Learning analytics has evolved from different branch of science such as statistics, information science, sociology, data mining, and machine learning, to interpret data gathered during learning, teaching, and education administration, along with other services. Thus, learning analytics represent analysis of a large volume of data originated and collected from various sources by student and researchers to analyze the performance assessment of students and future trends of the market. According to a report by Research And Markets[1], the global education and learning analytics market size is expected to reach USD 49.12 billion by 2025, while based on the Market Research Future (MRFR) Analysis[2] (Figure 3), the market will register an estimated CAGR of 26% over the forecast period 2017-2023.

In terms of learning analytics type, the study by Research And Markets found that the prescriptive segment is expected to register a CAGR of around 20% over the forecast period. In terms of the prominent end-use, academics sector is expected to grow at a significant rate over the next six years, owing to the rising concerns of educational institutions regarding student retention, reducing attrition, and timely feedback. The stud also reported that the enterprise end-use segment is likely to continue to dominate the market over the forecast period owing to the increased awareness about the benefits of learning analytics in prioritizing educational programs that can lead to the desired outcomes. Finally, the study confirmed that the services segment is poised for high growth in the near future owing to increasing adoption of education analytics solutions in academic institutes as well as enterprises for support & maintenance.

On the other side, lack of technical expertise to implement learning analytics and lack of data storage infrastructure are presumed to be a major concern for the market (MRFR Analysis).

3.1.2 Serious games

Serious games are games designed for education. The primary function of serious games is to provide knowledge, train, inform, memorize, and teach end users, rather than mere entertainment. It enables advertisers to optimize brand awareness by increasing receptiveness of message, target

[1] https://www.researchandmarkets.com/reports/4871264/education-and-learning-analytics-market-size#rela2-4900557
[2] https://www.marketresearchfuture.com/reports/learning-analytics-market-5634

more audience, and generate additional traffic to their websites. It also helps to increase motivation among students bridging the gap between theory and practice. Serious games are also used in other sectors, such as inspection, technical training, competency evaluation, simulations, etc. Based on the analysis by Allied Market Research[3], the global serious games market was valued at USD 2,731 million in 2016, and is expected to reach USD 9,167 million by 2023, growing at a CAGR of 19.2% from 2017 to 2023.

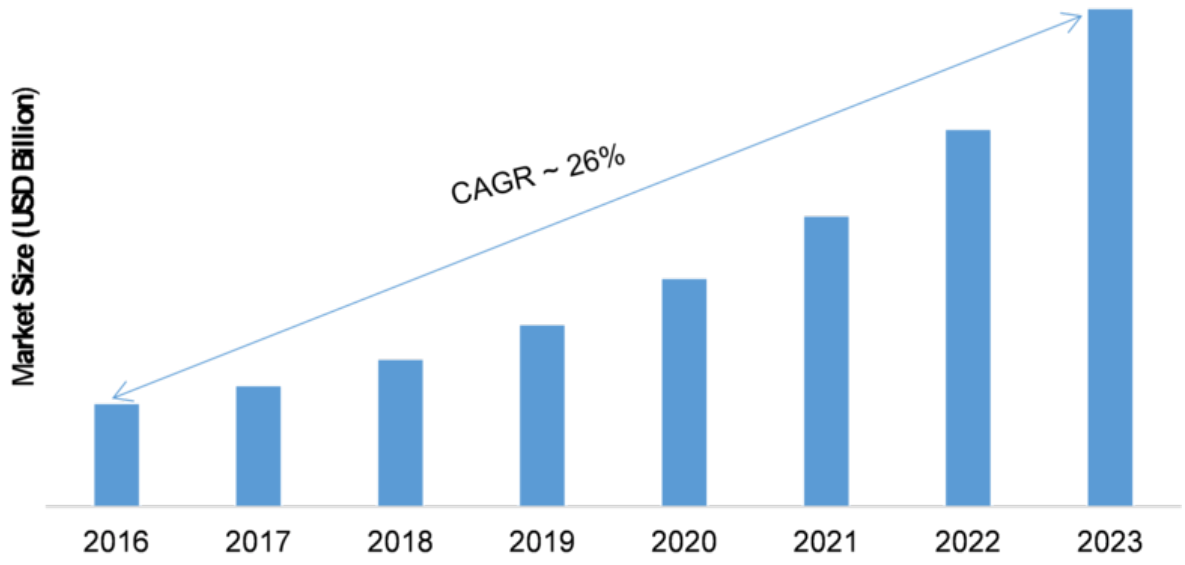

Figure 3. The Global Learning Analytics Market, 2017-2023 (USD Billion, Source: MRFR Analysis)

The serious games market is segmented based on user type, application, industry vertical, and geography. Based on application, the market is classified into advertising & marketing, simulation training, research & planning, human resources, and others. The analysis has shown that the simulation training segment is projected as one of the more lucrative engagements.

Based on the aforementioned analysis, the major factors that drive the market growth are increased need for user engagement across enterprises, growth in usage of mobile-based educational games, and improvement in learning outcomes. Improper game design and lack of awareness about serious games hinder the growth of the market. Large-scale digitization and emergence of social networks pave new opportunities in the market.

[3] https://www.alliedmarketresearch.com/serious-games-market

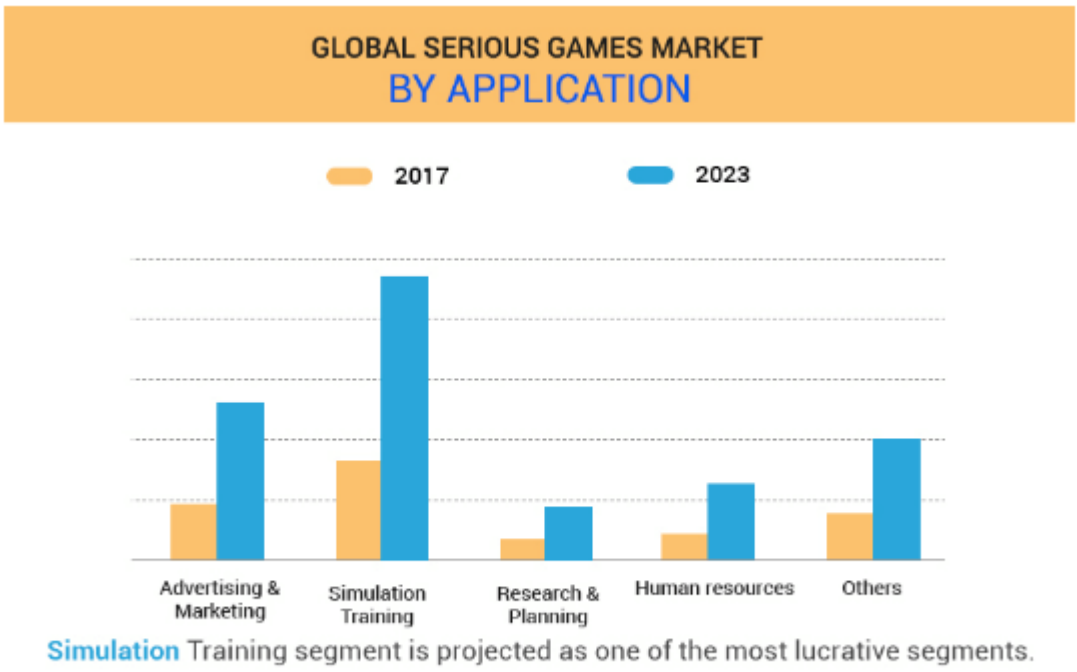

Figure 4. Simulation training is projected to be the more lucrative segment of serious games (Allied Market Research)

3.2 Target Audience

In a next step, the exploitation items identified in the previous chapter are evaluated for composition in service and product offering having the market analysis and target audience in mind. The outcomes aim to contribute to the needs of the following, learning and teaching related communities and stakeholders:

- **Commercial Learning Service Providers:** parties that commercially offer learning or pedagogical support services to private and public sector entities. The FLIP2G results need to be transformed into services that satisfy needs by these stakeholders. This transformation is mainly a transformation of available results into stable, productive elements as well as a meaningful composition of concepts, content and technological results.
- **Academic and Teaching Community:** the academic and teaching community is attracted by specific elements that display the integration of problem/project-based learning and serious

games in flipped classrooms. The concepts developed and pilots performed act as best practices in establishing innovative technological solutions.

- **Research and Development Community:** The research and development community is involved to allow for a sustainability of results independent of technological readiness and maturity. Following an open innovation approach, interested parties can get involved as developers of technologies and concepts using FLIP2G results as a baseline.

4 Individual Exploitation Plans

During the reporting period, a concise picture of the innovative results to be achieved by the project has been established, resulting in individual exploitation plans with the opportunities each partner wants to explore. These plans have been collected, using individual partner input through offline interviews using a questionnaire form. The proposed template that was circulated around partners can be found below. Finally, these individual partner plans are made available to all partners for alignment of strategies and review/refinement purposes during the upcoming period. The individual plans are subject to change as new insights and ideas arise how to apply results along the line of innovative solutions maturing.

Each partner has developed detailed plans for exploitation. These single plans include information on:

(i) partner profile;

(ii) motivation to participate in the project and commitment;

(iii) means to achieve the objectives;

(iv) opportunity related to exploitable assets;

(v) exploitable assets and results;

(vi) rationale

Over the course of the project, the partners have identified potential opportunities to exploit the results of the project. Naturally, this is shaped primarily by the focus of the organizations involved.

4.1 Individual Exploitation Plan: Aalborg University

Aalborg University, Denmark www.aau.dk

Editor(s):	Evangelia Triantafyllou
Date of plan:	10/05/2020

4.1.1 Partner profile

Aalborg University (AAU) in Denmark has a profile as a dynamic, interdisciplinary, and innovative research and educational institution oriented towards the surrounding world. AAU is characterised by combining a keen engagement in local, regional, and national issues with an active commitment to international collaboration. AAU is ranking amongst the best and most acknowledged international universities in the world – in the top 2% of the world's 17,000 universities. More than 20.000 students are enrolled at AAU of whom approximately 20% are international students hailing from different countries around the world. The university employs approximately 2000 faculty and 800 administrative/technical staff.

The main teaching and study form at AAU is Problem-Based Learning (PBL) and Project-Organised Problem-Based Learning (POPBL), teaching, research and innovation. The study programmes at Aalborg University are characterised by problem solving group work centred on authentic projects, often solved in collaboration with the industry. The PBL-based pedagogical model has become both nationally and internationally recognised by universities, researchers, and students as an advanced and efficient learning model. In February 2007, UNESCO has thus placed its only Danish Chair in PBL at Aalborg University. Finally, AAU combines a keen engagement in local, regional, and national issues with an active commitment to international collaboration.

4.1.2 Motivation and commitment

In this project, AAU participates with the Medialogy section at the Architecture, Design and Media Technology department, which has a proven and long experience regarding PBL implementation and hosts a highly successful educational program at bachelor, master and Ph.D. level. AAU aims at using the FLIP2G approach in order to better facilitate student learning paths in its PBL approach. The FLIP2G approach can be used to better support active learning during in-class lectures, since the AAU PBL model does not specifically describe how lectures should be structured. The project will also help to support the already established flipped-courses by providing alternatives to out-of-class game-based activities that can also motivate and better engage students. Finally, the FLIP2G approach will provide methods and tools to collect student data during PBL pathways and use this data in order to draw conclusions about student attainment and engagement. These conclusions can be used to improve teaching and learning at AAU.

In a wider context, the FLIP2G approach can be integrated to the PBL Aalborg Model in order to enhance its pedagogical value by incorporating new technologies, like online game-based learning and learning analytics. This integration can ensure that the PBL Aalborg Model remains a world acclaimed, radical pedagogical innovation and that AAU remains at the international forefront in developing PBL. This project can re-conceptualize how PBL could operate in new formats, based on the core principles of PBL, while exploring and developing new digital approaches that operate in and open up for new hybrid PBL learning models. An important goal of AAU is to have a high degree of global and local impact. This can be achieved within FLIP2G by setting a research agenda for PBL in a digital age that will attract international attention as new directions for more student-centered learning is a global need.

4.1.3 Means to achieve the objectives

The research and innovation team consists of five persons. During the last four years, an internal research project on the future of PBL in the digital era has been running at AAU, and the team, which has a close collaboration with the researchers in this project, aims at merging the results from these two projects in order to create new knowledge that will further advance PBL. Moreover, the research and innovation team maintains close collaboration and development with other AAU researchers, who are experts in technology-enhanced learning, learning design and game-based

learning. Finally, four parallel E+ projects enable the establishment of a learning innovation community, by installing sub-communities per project domain, and enable not only the collaborative development within a project, but more interestingly the collaborative development between projects and independent researchers.

Visible opportunity: The unique selling point of AAU is its PBL model and the implementation of the model in various study programs at university level. We see therefore the market on PBL implementation incorporating the FLIP2G approach as an interesting innovative element.

Exploitable assets and results: FLIP2G enables a new PBL implementation incorporating novel technologies. The new implementation can be applied to guide and monitor PBL course work at various AAU study programs.

1. **The FLIP2G data-driven pedagogical model that combines PBL and flipped classroom with game-based learning** – this model will support the learning design of innovative teaching approaches
2. **Learning Design based on the FLIP2G model** – the learning design framework will support the instantiation of learning designs applying the FLIP2G approach in different courses and educational contexts
3. **A new educational game platform** - a new online environment, which incorporates educational activities and novel FLIP2G technologies

4.1.4 Exploitable assets and results

Describe the exploitable assets and results from the project as an overview and per item:

ASSET	SHORT DESCRIPTION	HOW EXPLOITED
The FLIP2G pedagogical model that combines PBL and flipped classroom with game-based learning	• A model that can be applied in different courses/studies/contexts • Incorporates game-based learning elements • A data-driven model, which is supported by learning analytics	• Employed to guide learning design for PBL flipped classrooms • Enriches the current PBL model • Applicable in different educational levels/fields
Learning Design based on the FLIP2G	• A learning design framework to support the instantiation of learning designs for the FLIP2G approach	• Improves the activity planning of flipped classrooms • Takes into account assessment of

model		teaching/learning
A new educational game platform	• Implementation of an online environment to facilitate flipped classrooms • Online activities and material based on PBL and game-based learning	• Use for improved student learning and motivation • Use for internal structuring of PBL flipped classrooms

4.1.5 Rationale

The Exploitation path is twofold:

First, the new educational game platform for PBL flipped classrooms will contribute to increased student motivation and engagement, better student support by teachers, wider variety of learning activities, and better communication between students and teachers. Therefore, the FLIP2G approach will contribute to increased quality of service towards university students.

Second, the FLIP2G platform will provide teachers with student data but also teacher data, therefore contributing to teacher development and improved performance. This will strengthen AAU's teaching.

4.2 Individual Exploitation Plan: Nurogames

Nurogames, Germany

Editor(s):	Lena Werthmann
Date of plan:	28.05.2020

4.2.1 Partner profile

Nurogames GmbH, Cologne/Germany is an independent games development company, founded in early 2006 by practised experts of the games and media industry. Next to our head office in Cologne, we maintain representative offices in Barcelona and Berlin. Since April 2011, the Berlin-based lbxgames GmbH and lieblinx GmbH are a part of the company and form a strong strategic alliance. Nurogames covers a wide range of work experience, comprising high-skill development for mobile and cross-platform games, leisure applications being our main field of activity. Another focus of the company is placed on the development of games for Xbox 360 (Kinect), Playstation 3, Playstation Vita, Nintendo 3DS, Nintendo DS and Nintendo Wii. Furthermore, we develop mobile games/ applications and social games. The mobile division is specializing in the development, production and marketing of mobile applications for iOS and Android Smartphone and Tablet, as well as contents, ranging from innovative applications like games, active screens, instant messaging etc. to podcast solutions. Currently developments have been ordered for iPhone/iPad touch platforms and Android applications as application for other application stores as well (Windows Marketplace, Mac App

Store, etc.). Further working fields include the development of web-based e-learning games and game based e learning evolutions as well as the realization of online and browser games for an international market. By participating in multiple research projects on a national and international level, Nurogames ensure the long-term orientation and the knowledge of state-of-the art technologies. The Team of Nurogames has many years of experience in research projects of the BMBF and the European Union. They include such projects as SmartGaming, Gerigames, SeaClouds, SpITKom, SPIELBAR, MMOBG Development MEDIA.

4.2.2 Motivation and commitment

In recent years, Nurogames has focused on gamification in research and development projects, a trend where both our commercial as well as our R&D projects have improved through. Nurogames objective is to increase its knowledge in gamification and especially work together with partners from different fields, to gather even more expertise in this field and use it and our cross-disciplinary knowledge to create innovative gamification projects.

Edutainment or Gamified Learning is one of the most important points, considered the future of gamification. It enables the student as well as the teacher to improve student learning, and the objective of Nurogames is to support and improve this learning and raise engagement via techniques known from gamification, serious games and entertainment games. The Flip2G approach is a good strategy to apply this knowledge while improving it at the same time.

4.2.3 Means to achieve the objectives

Nurogames is currently creating a game prototype that accompanies the principles of the Flip2G approach. The goal is to create a prototype, which has a wide range of applications, a target group that possibly includes any student above the age of 12 and is customizable by teachers to support the content actually taught in class.

A team of five people works on the project, and it has created a working prototype based on extensive research in edutainment games, and feedback by the educational partners. Over the course of the project, gathered knowledge will be used to iterate the prototype and improve performance.

Visible opportunity:

Integrating digital means into learning processes is an important aspect of teaching which has only been used extensively in recent years. Many mistakes can be made when combining those two contrary aspects, and have been made in the past. However, recently, the e-learning research community has improved rapidly and supported its findings with scientific facts. The Flip2G gaming platform is one example of this and another step in progress.

4.2.4 Exploitable assets and results

Describe the exploitable assets and results from the project as an overview and per item.

Table 4. Exploitable assets and results of Nurogames

ASSET	SHORT DESCRIPTION	HOW EXPLOITED
Gaming Environment Teacher Tool	A Tool for teachers to manage students and content of the games	• Company knowledge about gamification and management tools improvement • Research and Knowledge in the areas of CMTs • Differentiation between CMTs and gamification tools • Manual changes of the gaming environment enable adaptation towards student performance
Gaming Platform	An online gaming platform to be used in the Flip2G concept	• Use for students in class and out of class to work hand in hand with other assignments • Improvement of engagement and motivation in learning

4.2.5 Rationale

Both the gaming platform used by the students and the teacher tool used by teachers work hand in hand to support the Flip2G approach and enable learning in a gamified way. Gaming assignments can be added at any point during classes or at home. Teachers can adapt the games at any stage (before they are actively played) and thus change the content and, for example, difficulty of the game based on the feedback and assessment of students.

Gamification in education has been proven to improve engagement, motivation and fun while learning, both in children and in adults. While end results of content learnt are often comparable, the process of learning through gaming is more intuitive, emotionally rewarding and motivating for the learner.

4.3 Individual Exploitation Plan: University of Macedonia

University of Macedonia, UOM, http://www.uom.gr

Editor(s):	Konstantinos Tarabanis, Efthimios Tambouris
Date of plan:	28/05/2020

4.3.1 Partner profile

The University of Macedonia (UOM) of Economic and Social Sciences was established in 1948 and currently has 8 departments, 7 departmental and 3 interdepartmental postgraduate programmes. It has a long record in research and educational activities including participation in European programmes such as Erasmus-ECTS, Alfa, ADAPT, Leonardo, Tempus, Med-Campus, Continuing Education Program and Jean Monnet.

Combining the scientific fields of Business Administration and Information Technology, the Information Systems Laboratory operates as a part of the Business Administration Department of UOM and is directed by Prof. Konstantinos Tarabanis. The laboratory's areas of expertise vary and include:

- Conceptual and domain modelling.
- Open Data and Linked Data
- The Use of Web 2.0 and semantic technologies in eLearning and eGovernment.
- E-Learning Systems and their role in the educational process.

During the last years, the laboratory has supervised PhD thesis and Masters dissertations in the area of learning and ICT. It has also implemented relevant projects through the Research Committee of UOM including:

- PBL3.0: Integrating Learning Analytics and Semantics in Problem-Based Learning (2016 – 2018)
- "ODEdu: Innovative Open Data Education and Training based on PBL and Learning Analytics" (2016 – 2018)
- "RBDICT: Regional Business Development through the Use of Information and Communication Technologies" (2011-2013).
- LLP KA3 Multilateral project. "EATrain2: Innovative Enterprise Architecture Education and Training Based on Web 2.0 Technologies" (2009-2010).
- "Postgraduate program in Information Systems for FYROM: Development of common educational activities - transfer of know-how" (2005-2008).

The same team was involved in / coordinated the following Horizon2020 and FP7 research projects:

- OpenGovIntelligence (2016-2019)
- OpenCube (2013-2015)
- Linked2Media (2011-2014)
- Linked2Safety (2011-2014)

4.3.2 Motivation and commitment

UOM plans to improve significantly its current knowledge, expertise and educational / training services in the domains of game-based learning, PBL and LA. At the same time, UOM intends to strengthen further its research position in these domains and to be able to form successful research collaborations in the future.

UOM intends to make the research community and higher education aware of the FLIP2G project results. This will be achieved by participating in open discussions, lectures, tutorials, presentations and exhibit events with the project's results, and by publishing results in scientific conferences and international journals.

UOM intends to exploit the FLIP2G results for enriching its teaching portfolio and make students and PhD candidates aware of the project results and the FLIP2G knowledge alliance. The educational assets will be used as a resource for students' lectures and will be continuously updated and expanded as needed.

The target audience of UOM's exploitation activities includes:

- Graduate and post-graduate students of the University of Macedonia and the Hellenic Open University, including many employees as post-graduate students
- Trainees of specialisation courses of the University of Macedonia, including public servants and private employees
- European and Greek research community, especially eLearning and LA experts
- Future research consortia and project partners
- National, regional and local-level public administrations in Greece and across EU

4.3.3 Means to achieve the objectives

An overview of the main channels that UOM will use to exploit the results is given below:

Teaching/Education channels:

- External Programmes
- University courses

External programmes: UOM organises educational programmes for external stakeholders in the context of lifelong learning and the development of skills. Programs on specialized issues are organised when sufficient external interest is secured. The programs bear a specific cost to participants

Research channels:

- Academic papers or conferences
- Further refinement in future research projects

The primary target groups consist of the University undergraduate and post graduate students as well as external programme students where the main marketing channels must focus. Other secondary target groups such as teaching staff and research groups will be approached by ad hoc and informal means, such as bilateral meetings or briefings.

The marketing mix is dependent upon the mode of availability of the exploitable items and material after the end of the project. UOM, as a public body, has predefined channels of publicity. Indicatively, the main vehicles are:

- Via UOM webpages (www.uom.gr, www.islab.uom.gr , departmental sites, news and events)
- UOM press –the internal publishing house of the University
- Posters available at the University premises
- Spill over via publications and conferences.

Estimation of users of the specific results:

In terms of users, an initial approximation is estimated as follows:

Education/Teaching target groups

- University teaching staff : cannot be estimated
- University Undergraduate programmes: 30-40 users annually (indicatively for courses)
- University Post graduate programmes : 30 users annually (indicatively for courses)
- University Specialized External Programmes: 15 users annually per programme

Research Academia target groups mainly involve:

- Research groups within UOM (laboratories, PhD students groups, etc): 15 users (indicatively)
- Conference audiences (ICT or governance-related): estimation not applicable
- Academic publication audiences (journals, books, etc.): estimation not applicable

4.3.4 Exploitable assets and results

Describe the exploitable assets and results from the project as an overview and per item

Table 5: Exploitable assets and results of UOM

ASSET	SHORT DESCRIPTION	HOW EXPLOITED
The FLIP2G pedagogical model	- A model that can be applied in different	- Consult model for course design,

that combines PBL and flipped classroom with game-based learning	courses/studies/contexts - Incorporates game-based learning elements - A data-driven model, which is supported by learning analytics	delivery and assessment
Learning Design based on the FLIP2G model	- A learning design framework to support the instantiation of learning designs for the FLIP2G approach	- Design courses based on the learning design template
A new educational game platform	- Implementation of an online environment to facilitate flipped classrooms - Online activities and material based on PBL and game-based learning	- Use game for courses' delivery - Consult LA dashboard for students' performances and ongoing scaffolding / interventions

4.3.5 Rationale

The items for exploitation can be considered as vertical aspects for providing a holistic approach on novel teaching aspects, i.e. identified PBL model steps and available gamification and LA tools, as well as learning designs suitable for teaching students (undergraduate and post graduate students). The FLIP2G pedagogical model will be used as a reference point for further research refinements (e.g. academic papers, conferences etc.) and for educational activities, therefore acquainting students with participatory learning and immersive learning experiences. The FLIP2G model, the gaming environment, the LA dashboard and the learning designs will be used for solely educational purposes, to underpin the learning processes. The University trials could be used as implementation examples to display successful aspects to other interested parties. All items may be reshaped, updated and customized in the future to reflect current needs and developments in the field. It is therefore inferred that exploitable items serve either educational/teaching purposes (internal university departments) or research purposes (further research, publications and conferences).

4.4 Individual Exploitation Plan: Artelnics

Artificial Intelligence Techniques, Spain

Editor(s):	Roberto Lopez
Date of plan:	25/05/2020

4.4.1 Partner profile

Artelnics is a company specialized in creating artificial intelligence solutions for the benefit of our customers. We are a team of scientists and engineers with more than 15 years of experience in artificial intelligence.

Artelnics is a company based on the knowledge acquired in universities and research centers for more than 10 years. We participate in research projects to develop the most innovative artificial intelligence technology.

OpenNN (https://www.opennn.net/) is a framework that allows developers to build artificial intelligence models using cutting-edge algorithms. This library is open source and it is being used by many thousands of machine learning researchers worldwide. In order to facilitate the use of machine learning by companies, we have created Neural Designer (https://www.neuraldesigner.com/). This platform allows analysing data and building predictive models with just a few clicks, without programming.

Artelnics also develops projects for companies in different sectors. Our technology helps them to make better decisions, improving their results. For example, in the industry sector, we have carried out projects to improve energy efficiency or anticipate system failures. In healthcare, we have created algorithms for early diagnosis of diseases using physiological data, genetic factors and computer vision. Finally, in the retail sector, we have built predictive models to boost cross-selling or prevent customer churn.

4.4.2 Motivation and commitment

As we have said, Artelnics develops artificial intelligence solutions in different sectors. Among all, those related to social sciences are becoming increasingly important to the company. Some use cases here are getting new customers for a company or increasing their loyalty using data analytics.

An emerging solution within machine learning is the analysis of data about learning processes, especially virtual environments. This is known as learning analytics, and allows predicting learners' performance, providing learners with a personalized experience, increase learners' retention rates, etc.

The rise of online learning implies new opportunities for a company that can maximize the potential of learners through data science and machine learning.

However, analyzing socio-demographic factors, engagement variables, performance data, etc. is complicated. These types of data are very heterogeneous, and the interactions between the factors that influence learning processes are very complex.

In this regard, the main motivation of Artelnics to join the FLIP2G project was to gain experience in applying artificial intelligence in the learning sector. This will allow us to increase our offer of products and services.

The commitment of Artelnics is to become the world's leading experts in the field of learning analytics. This competitive advantage will allow us to get an important market share in the e-learning sector.

Our first objective in the project is to write a scientific article of international reference, which places us as an important authority in the field of learning analytics.

The second objective for our company is to get a success story of a tool that allows reducing student dropout and improving their performance.

4.4.3 Means to achieve the objectives

Artelnics has built a team of four people to achieve the objectives of the project. We have developed machine learning algorithms to discover relationships, recognize patterns and make predictions from learning data. The company has also validated the capabilities of that algorithms with public learning analytics datasets. Our team has developed dashboards that contain diagnostic, descriptive, predictive and prescriptive analytics for whole modules and individual students. We are writing, together with other members of the project, a scientific article that will be presented for publication in a top learning analytics journal. Finally, we will apply these techniques in several courses, in the corresponding work packages of the project.

Visible opportunity: E-learning is becoming increasingly important. Indeed, more and more people choose this method to train or to complement their studies. But this type of training has some drawbacks. The most important one is its high dropout rate.

Learning analytics allows designing personalized learning experiences that increase the engagement of students, and finally reduce their risk of dropout and increase their performance.

This is a new and growing sector, and it can provide great benefits to those companies that can bring innovative products.

4.4.4 Exploitable assets and results

The exploitable assets and results from the project are listed in the following table.

Table 6. Exploitable assets and results of ARTELNICS

ASSET	SHORT DESCRIPTION	HOW EXPLOITED
Course	Course designs that can be employed in	Company knowledge about problem

designs	higher education institutions, secondary schools and trainings of private or public employees.	domain.
Learning analytics algorithms	Employ learning analytics tools for providing insights on the learning process.	-Predict learners' performance. -Provide learners with a personalized experience. -Increased learners' retention rates. -Improve future eLearning courses. -Boost cost efficiency.
Learning analytics dashboards	Produce meaningful visualizations of the learning analytics results for educators.	Improved visualization of key performance indicators, learning performance and recommendations.

4.4.5 Rationale

Learning analytics provides important benefits for students and educators. Some of them are the following.

With the data provided, we can analyse how particular students performed based on their own learning patterns, taking into consideration socio-demographical, course engagement, prior performance, and any other factors we care to monitor. We can even use learning analytics to tailor learning to a student's or group of students' particular interests.

Learning analytics helps educators determine how well students have mastered content and through what means, and also can assess student's risk level. Identifying blocks of students who may have academic or behavioural challenges helps educators to develop the interventions to prevent them while predicting success can help students reach their full potential.

4.5 Individual Exploitation Plan: University of Northumbria at Newcastle

University of Northumbria at Newcastle, United Kingdom www.northumbria.ac.uk

Editor(s):	Eleni Dermentzi
Date of plan:	22/05/2020

4.5.1 Partner profile

The University of Northumbria at Newcastle (UNN) is a research-rich, business-focused, professional university with a global reputation for academic excellence. Based in the heart of Newcastle upon Tyne, it has over 27,000 students from over 100 countries enrolled at undergraduate and post-graduate level including over 500 PhD students. The University is international in its operations and

reach, with programmes delivered in Newcastle upon Tyne, London and worldwide. UNN has a strong profile in Asia, with regional offices in China, India, Malaysia and Thailand. UNN works with major employers, including Nike, IBM, Nissan, the BBC, and the NHS, while more than 560 employers and 60 professional bodies sponsor or accredit the University's programmes.

UNN is dedicated to supporting the career development of all researchers, evidenced by the European Commission HR Excellence in Research status held since 2013. UNN also has substantial experience as partner or coordinator in international research projects, including over 30 projects from the European Commission programmes FP5 to Horizon 2020, as well as a further 30 projects from other EC funding sources (Erasmus, Tempus, ERDF and Interreg). The total value of these projects is approximately £25M. The University currently coordinates or participates in 20 Horizon 2020/FP7 projects, including 10 Marie Sklodowska Curie actions (individual fellowships, RISE/IRSES, ITNs), and 10 other collaborative research projects of various types.

4.5.2 Motivation and commitment

UNN participates in the project with the Newcastle Business School, which has a global reputation for delivering some of the best business management education in the UK. The School is part of an elite group of business schools worldwide, following accreditation by the Association to Advance Collegiate Schools of Business (AACSB) in business and accounting – the first in Europe to gain the double accreditation. It has also received accreditation from EFMD Programme Accreditation System (EPAS) for 21 undergraduate programmes, more than any Business school in the UK. EPAS is part of the European Foundation for Management Development (EFMD) accreditation programme – the leading international management development network. The School operates Corporate and Executive Development Centre, which works with over 700 leaders and managers offering learning experiences that enable significant and sustainable change. It offers a wide range of courses, of different types (i.e. Undergraduate, Postgraduate, Degree Apprenticeships) and modes of study (i.e. Full Time, Part Time, Distance Learning).

In this project, UNN has a twofold objective: on the one hand to support effectively student learning and increase student engagement by applying the FLIP2G approach and on the other hand to evaluate the potential of learning analytics to transform Higher Education. Regarding the first part of the objective, UNN would like to use the FLIP2G approach in the delivery of modules with distinct characteristics, such as the ones delivered as part of the Degree Apprenticeships (where the aim is to support the development of skills and applied knowledge in professionals) or Distance Learning programmes (where motivating students to engage with the course activities outside the online sessions can be challenging). As far as the second part of the goal is concerned, UNN has included the implementation of educational analytics (i.e. a broader term that includes learning analytics, academic analytics and, institutional analytics) in its University Strategy 2018-2023 (Using Student Data for Educational Analytics policy). Thus, the project will give the opportunity to UNN not only to

improve the offering of its Degree Apprenticeship and Distance Learning programmes, but also to move towards implementing its strategy.

4.5.3 Means to achieve the objectives

As mentioned above, educational analytics are part of UNN's strategy for the next years and the University actively promotes the use of them to support students. There are currently other research projects that run at an organisational level that focus on the exploitation of educational analytics, which has created an opportunity for starting a dialogue with other researchers in the institutions.

Newcastle Business School has also significant experience in delivering teaching to Degree Apprenticeship students and distance learners, which can be capitalized to ensure that the FLIP2G model will be applied effectively to these settings. The lead researcher has also experience in applying PBL method in physical classrooms (at University level), which can facilitate the transition to the FLIP2G pedagogical model.

Visible opportunity: UNN offers courses to a diverse audience at a university level, so there is an opportunity to try the FLIP2G approach and game platform with students from various backgrounds that need extra support to meet their learning goals (such as professionals or distance learners). In addition, the UNN's interest and experience in educational analytics means that there is an additional opportunity for exchanging good practices when it comes to transforming higher education via analytics.

4.5.4 Exploitable assets and results

The FLIP2G project enables the design of a new pedagogical model that combines the flipped classroom strategy with PBL features and data analytics. The new approach can be applied to the delivery of modules attended by UNN's diverse cohorts.

1. The FLIP2G data-driven pedagogical model that combines PBL and flipped classroom with game-based learning – this model will support the learning design of innovative teaching approaches
2. Learning Design based on the FLIP2G model – the learning design framework will support the instantiation of learning designs applying the FLIP2G approach in different courses and educational contexts
3. A new educational game platform - a new online environment, which incorporates educational activities and novel FLIP2G technologies

Table 7: Exploitable assets and results of UNN.

ASSET	SHORT DESCRIPTION	HOW EXPLOITED
The FLIP2G	• A model that can be applied in	• Used to introduce UNN's

data-driven pedagogical model	different courses/studies/contexts • Incorporates game-based learning elements • A data-driven model, which is supported by learning analytics	students to the flipped classroom and PBL approaches. • Used to enrich UNN's understanding of how learning analytics can drive interventions that support students' learning.
Learning Design based on the FLIP2G model	• A learning design framework to support the instantiation of learning designs for the FLIP2G approach	• Used for developing learning designs suitable for distance learners and professionals.
A new educational game platform	• Implementation of an online environment to facilitate flipped classrooms • Online activities and material based on PBL and game-based learning	• Used for engaging distance learners with learning activities that need to be completed before/after the online sessions. • Used for supporting the development of applied knowledge by professionals.

4.5.5 Rationale

The FLIP2G pedagogical model and the learning designs based on it will allow the teaching team to introduce PBL and game- based learning to the UNN students in an organised way. PBL and flipped classroom approaches are ideal for distance learners and professionals, who focus on the development of practical skills and applied knowledge. These types of cohorts also have limited time for studying and need extra guidance and motivation in order to complete learning activities outside the classroom (either preparatory or consolidating learning activities). With the help of the game platform, we expect that will be able to increase student engagement and participation in the module (by providing a more interesting learning environment) and support them further in their learning journey (e.g. by guiding them step-by-step with the help of the mini games in completing the required activities).

The learning analytics will support the teaching team in providing extra guidance to the students that need it most (e.g. they are at risk to drop out). This is essential for distance learners as the tutors cannot easily check the students' progress due to lack of face-to-face interaction. The use of learning analytics will also help the UNN to understand further the role that they can play in transforming higher education.

4.6 Individual Exploitation Plan: Mandoulides Schools

Mandoulides Schools, https://mandoulides.edu.gr/en/

Editor(s):	Christos Malliarakis
Date of plan:	29/05/2020

4.6.1 Partner profile

Mandoulides Schools is a modern and dynamic educational, sports, and cultural community that is renowned throughout Greece.

The Schools include Day Care Center, Kindergarten, Elementary School, Junior - Senior High School, Counseling and Studies Abroad Center.

Mandoulides Schools have received wide recognition for their quality of service, innovative actions, new technologies, environmental programs and foreign languages. Mandoulides Schools are one of the three schools in Greece that have been selected by Microsoft as a “Microsoft Showcase School”.

This distinction for the Schools is a recognition of the innovative actions and educational programs that have been implemented for years, with emphasis on the use of new technologies both in education and in administration.

Programs such as Flipped Classroom, Watch & Learn, Case Studies, Art & Science Days and the digital platform “my.mandoulides” form an essential part of the educational process. They render technology an indispensable tool for students, they make the learning process more interactive and creative, and they ensure the proper operation of the Schools. In addition, Mandoulides Schools has organized and hosted the first International Hackathlon event, where students from any country and from primary to secondary courses can try to “hack” specifically designed websites using knowledge on multiple fields such as maths, science, history etc.

The teaching and administrative staff are properly trained and updated on new technologies and the use of innovative tools. Microsoft has singled out 69 Mandoulides Schools teachers as Microsoft Innovative Educator Experts for 2019-2020.

4.6.2 Motivation and commitment

Mandoulides Schools has years of experience in creating flipped courses in primary and secondary education, and aims to further enhance their knowledge on how to integrate novel technologies in this pedagogical model. Mandoulides is also a pioneer in innovation and has led an international Hackathlon event, where students can participate via Web, and try to “hack” specifically designed webpages using knowledge from different fields such as maths, science and history.

The school aims to further its knowledge on PBL-enhanced pedagogical models to be applied in their courses in order to increase their students' skills from an early age, and to improve their innovative actions by integrating educational games.

Mandoulides aims to include modern and motivating technological features in their courses, such as games, analytics and artificial intelligence in order to improve students' performances.

4.6.3 Means to achieve the objectives

An overview of the main channels that Mandoulides will use to exploit the results is given below:

Teaching/Education channels:

- School courses
- External programmes (e.g. hackathons, education events)

Mandoulides organises a number of educational events each year, in the context of introducing innovative technologies and promoting inclusive and immersive learning experiences (e.g. Mandoulides Computer Epathlon Camp, Mandoulides Programming Day, Mandoulides Robotixlab Day, Mandoulides Maths Games Day etc.)

Mandoulides Schools uses the following main communication channels:

- The school website (https://mandoulides.edu.gr/en/ /)
- Emails
- Facebook (https://www.facebook.com/mandoulides)

4.6.4 Exploitable assets and results

Describe the exploitable assets and results from the project as an overview and per item

Table 8: Exploitable assets and results of Mandoulides Schools

ASSET	SHORT DESCRIPTION	HOW EXPLOITED
The FLIP2G pedagogical model that combines PBL and flipped classroom with game-based learning	- A model that can be applied in different courses/studies/contexts - Incorporates game-based learning elements - A data-driven model, which is supported by learning	- The school will use the model to make decisions on their courses for secondary education

	analytics	
Learning Design based on the FLIP2G model	- A learning design framework to support the instantiation of learning designs for the FLIP2G approach	- The school will use the learning design template to document how the teachers will design their FLIP2G courses
A new educational game platform	- Implementation of an online environment to facilitate flipped classrooms - Online activities and material based on PBL and game-based learning	- Use game for courses' delivery - Use LA dashboard for monitoring and facilitating students' performances

4.6.5 Rationale

The teaching community of Mandoulides Schools is invested in delivering novel and up to date courses to their students. The FLIP2G pedagogical model will allow the school's students to develop lifelong learning skills and to increase their motivation to learn through immersive learning experiences such as serious games.

The school also aims to improve their existing expertise on the flipped classroom model, and employ this pedagogical paradigm using novel technologies such as games and combine it with participatory learning models such as PBL.

Finally, the school aims to increase teachers' facilitator role by using the LA dashboard to monitor students' progress and intervene when necessary. This will enable teachers to have a complete overview of the course's process and make better decisions when designing future iterations of the same course.

4.7 Individual Exploitation Plan: Revheim Skole

Revheim skole, Norway

Editor(s):	John Arne Gaard Nilsen, Eirik Jåtten
Date of plan:	26.05.2020

4.7.1 Partner profile

Revheim Skole is a lower secondary school for kids aged 13-16 in Stavanger, Norway. Revheim has had a huge focus on digitalization and the use of digital tools in classrooms over the past eight years. The municipality had a large-scale campaign towards digitalization with the introduction of

Chromebooks for every pupil in primary and lower secondary schools in the municipality. With Eirik Jåtten as headmaster at Revheim, the school moved away from using a laptop as a modern typewriter or an encyclopaedia and onto utilizing its full potential as a tool for the modern age pupils. The focus has since then been on using technology properly.

In continuation with this initiative, Revheim wanted to utilize games as a learning tool and applied for the Flip2G project in order to hire a gaming pedagogue that could work specifically towards using games in education. Together with a local eSports team, Revheim Skole got funding for a state-of-the-art gaming room with 20 gaming pc's readily available for use in classes at the school and as an extra-curricular activity for the eSport interested youth in the municipality. Since the start of summer 2019, the gaming pedagogue John Arne Gaard Nilsen, together with Revheims teachers, has been using commercial videogames to teach everything from language classes to history with great success. Game-based learning, teaching through the use of a videogame, is something Revheim now recognizes as one of its core learning methods.

4.7.2 Motivation and commitment

The motivation for Revheim is a natural continuation of the earlier mentioned pursuit of digitalization and the utilization of digital tools. For Eirik Jåtten, the principal of Revheim, the motivation in using different methods to teach lies in the fact that a rich and varied learning environment provides the best learning arena for the pupils of the school. With a dedicated project that can help flesh out a new game-based learning method it is Revheim's hope that it can provide pupils with a much needed and very helpful learning tool and that the teachers will have a new and up to date teaching tool. With already experience from using games a way to teach, a problem-based learning game with a flipped classroom model will be a natural and welcomed addition to Revheim's teachers and pupils. This game can be more customized to the curriculum and can fill some gaps in our gaming curriculum as well as add to our established methods. Our previous experience with games made for educational purposes has not been too positive because of the way they are inherently not good games, so we believe this project enables us to help make a game that will be fitting for use in primary education.

Our commitment lies in following up on the Flip2G project and making sure to give the appropriate feedback so that it will be useful and relevant for lower secondary schools education. Alongside this, we hope to extensively pilot the game so that we can give feedback on what works and what does not. The aforementioned bad experience with learning-based games often comes from games where there is a lack of understanding from the developers around learning and what good games are. Our primary objective is that our involvement hopefully can help steer the project from becoming a "bad" game if it shows signs of having the same poor traits as other learning based games have had. We at Revheim believe that our understanding of games and its uses in education is strong and therein lies a commitment to making what we think is a good game that is suitable for use in

education. Our second objective is to test a flipped classroom model with the use of a game to further enrich our way of learning with the help of digital tools. We see this as a perfect opportunity to develop our staff's skills by piloting the project.

4.7.3 Means to achieve the objectives:

In order to achieve these two objectives, it is important that more than just the gaming pedagogue and the principal is involved, and that relevant feedback is given. For the school to properly pilot the game and give the relevant feedback, we want to enroll several classes in different topics in order to find its strength and weaknesses. Since there has been a large focus on digitalization at the school, there should be plenty of interested parties. In order to get good feedback for the project, we plan to give both teachers and pupils evaluation forms for each class/subject they go through with the game. A good dialogue among the teachers who use it will be able to pinpoint struggles quickly and report them as well. There are also plans for establishing a group of pupils, who can be given the responsibility to give proper reflections on the use of the Flip2G gaming project, which will give richer insights into the project from a pupil's point of view than a standardized form.

The gaming pedagogue has established a network of other pedagogues that use games in their education and will be discussing with them his use of the Flip2G game in order to get a proper reflection around strength and weaknesses the game exhibits. This will prove useful when giving feedback to the designers since there is a good tradition among these teachers for using games and a relevant dialogue with them can give nuanced perspective on the project. This can also produce relevant questions to ask and things to consider when looking at further improvements after the project.

4.7.4 Exploitable assets and results

Describe the exploitable assets and results from the project as an overview and per item

Table 9: Exploitable assets and results of Revheim Skole

ASSET	SHORT DESCRIPTION	HOW EXPLOITED
The FLIP2G pedagogical model that combines PBL and flipped classroom with game-based learning	- A model that can be applied in different courses/studies/contexts - Incorporates game-based learning elements - A data-driven model, which is supported by learning analytics	- Revheim will be using these models to help with the selection of best suited topics or courses for Flip2G piloting and further testing them.

A new educational game platform	- A learning design framework to support the instantiation of learning designs for the FLIP2G approach	- Revheim wishes to experiment with the unique platform to further enhance our teacher and pupils' abilities in using games for learning. Adding to our repertoire of games used in education with an interesting twist. - We wish to use the framework to improve our understanding of the data we can collect to evaluate our pupils and to better help them progress.
Learning Design based on the FLIP2G model	- Implementation of an online environment to facilitate flipped classrooms - Online activities and material based on PBL and game-based learning	- Revheim's teachers will be using this in order to better plan their activities and the assessment thereof. This will also be shown to teachers who might be reluctant in using flipped classrooms which can help the transition.

4.7.5 Rationale

At Revheim, we have always been interested and keen on delving into new methods of teaching and as such wholly embraced digitalization. For the teaching platforms and tools to be at this level is something we look fondly forward to as we feel there are many solutions out there that tries to sell the perfect package, but neglect too many aspects to be a truly good solution. We envision that the Flip2G model will help us envelop a new teaching method that incorporates technology and gaming, which is at the core and be a leap forward in terms of educational technological solutions.

Over the course of the pandemic period, many classes at Revheim ramped up their use or their implementation of flipped classroom strategies and problem-based learning. The implementation of specialized games in addition to the flipped model will prove a useful tool for the further development of flipped classroom learning. We hope that teachers can use the different models and tools that this project provides to its fullest and provide the best learning experience for our pupils. With the help of data analytics, we hopefully get a more immersive look into what the pupils struggle with or what they successfully master, which then helps us become better and more focused teachers. In addition to this, the pupils themselves who struggle to find their way of learning might be able to use this project as a way to explore this.

5 Conclusion

The plans and strategies presented in this deliverable represent the preliminary results of the analysis conducted and revised in the initial reporting period of the project, intensified after the availability of results from the technical and application work packages. It comprises a view on the value of the project results, the main stakeholder description, the market conditions, the used methodology and the intentions of the consortium as a whole and individually to exploit the results of the project. The focus of this initial deliverable lies upon the methodology, its implication on the individual plans and impact on the exploitation and sustainability plans for the consortium as a whole.

In the upcoming period, these plans will be used to guide the validation and revise/detail outcomes according to the methodology defined.

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